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Stereoscopic Studies of Anatomy

Section V

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Biology

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ABDOMEN.

ABDOMINAL WALL.—No. 1.

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SUPERFICIAL FASCIA.

The skin has been removed from the lower part of the abdominal wall and upper part of the thighs, and also, on the right side, the superficial fascia.

The SUPERFICIAL FASCIA on the lower part of the anterior abdominal wall consists of two layers, a superficial fatty, and a deeper, more membranous layer.

The former is continuous with the fatty superficial fascia of adjacent regions; the latter, in the region of the pubes, is carried down over the spermatic cord, and becomes one of the layers of the wall of the scrotum. Outside this, it passes over Poupart's ligament, and blends with the fascia lata of the groin. This union limits the spread of extravasated urine downwards to the thighs.

Between the two layers are found some superficial vessels and cutaneous nerves.

Above the symphisis pubis, there is a strong band of elastic tissue which passes down to be connected with the root of the penis and its suspensory ligament (5).

CUTANEOUS NERVES are seen emerging through the aponeurosis of the external oblique muscle, the ilio-inguinal with the spermatic cord, through the external abdominal ring, the ilio-hypogastric a short distance above it, and the anterior branches of the lower intercostal nerves pierce the sheath of the rectus higher up.

The figures indicate—

LARGE NUMERALS:—

1. Superficial layer of the superficial fascia.
2. Deeper layer „ „ „
3 and 4. External oblique muscle and aponeurosis.
5. Elastic tissue collected into a strong band.
6. Spermatic cord.

SMALL NUMERALS:—

1. Ilio-hypogastric nerve.
2. Ilio-inguinal nerve.
3. Superficial epigastric vessels.
4. „ circumflex iliac vessels.
5. „ External pudic vessels.

ABDOMEN.

ABDOMINAL WALL—No. 2.

THE APONEUROSIS OF THE EXTERNAL OBLIQUE MUSCLE.

ON THE RIGHT SIDE, THE DEEP FASCIA, AND ON THE LEFT, SOME SUPERFICIAL STRUCTURES OF THE GROIN ARE SEEN.

The aponeurosis of the external oblique muscle terminates in its lower part in Poupart's ligament. This ligament runs in a curved line from the anterior superior spine of the ilium to the spine of the pubis. The deep fascia of the thigh is attached to it, and it lies at the bottom of a depression. The superficial inguinal vessels are seen running in different directions, the superficial circumflex iliac towards the anterior superior spine, the superficial epigastric over Poupart's ligament, and the superficial external pudic over the spermatic cord towards the scrotum. The superficial inguinal glands are shown on the right side, with the long saphenous vein. On the left, that vein has been divided and turned aside, to show its termination in the femoral vein.

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The figures indicate—

1. Muscular part of External oblique.
2. Aponeurosis of „ and arcuate fibres.
3. Poupart's ligament.
4. Linea alba.
5. Pubic part of fascia lata.
6. Iliac „ „
7. Fascia covering Sartorius muscle.
8. Spermatic cord, and ilio-inguinal nerve.
9. Cribriform fascia.
10. Long saphenous vein.
11. Femoral vein.
12. Femoral lymph gland.
13. Inguinal „
14. Elastic tissue of superficial fascia of abdominal wall.

ABDOMEN.

ABDOMINAL WALL—No. 3.

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The external oblique muscle and aponeurosis are displayed, with cutaneous nerves on one side.

The *external oblique* is a wide flat muscle, which takes origin from outer surfaces and lower borders of the lower eight ribs, interdigitating with the serratus magnus above and with the latissimus dorsi below. The *aponeurosis* extends in a vertical direction from the ensiform cartilage above to the crest of the pubis below, and between these points it is inserted into the linea alba, the fibres decussating with those of the opposite side.

The aponeurosis is very wide below, where it occupies the whole of the lower part of the anterior abdominal wall, as the muscular fibres do not extend below the level of the anterior superior iliac spine, and the pectoralis muscle takes origin from the upper part of the aponeurosis.

The *cutaneous nerves* which are seen piercing the aponeurosis of the muscle are the small terminal branches of the lower five intercostal nerves, and the ilio-hypogastric lower down, while some lateral cutaneous branches of the intercostal nerves are seen piercing the muscle.

The anterior cutaneous nerves, after piercing the aponeurosis, pass in an outward direction.

The figures indicate—

1. Lower costo-sternal fibres of pectoralis major muscle.
2. Slip of pectoralis major muscle, arising from aponeurosis of external oblique.
3. Digitation of the serratus magnus muscle.
4. Digitation of the external oblique muscle.
5. Aponeurosis of the external oblique muscle.
6. Inner pillar of the external abdominal ring.
7. Lower portion of the mammary gland.
8. Anterior cutaneous nerves.
9. Lateral cutaneous nerves.

ABDOMEN—ABDOMINAL WALL. No. 3.

SECTION V.

ABDOMEN

ABDOMINAL WALL.—No 4.

INTERNAL OBLIQUE, TRANSVERSALIS, AND RECTUS ABDOMINIS MUSCLES.

The external oblique muscles have been reflected, and the internal oblique muscle of the left side, as well as the anterior wall of the sheath of the rectus in nearly its whole extent.

The *internal oblique* muscle arises from the outer half of Poupart's ligament, from the middle lip of the anterior two-thirds of the crest of the ilium and from the lumbar aponeurosis, and the fibres are seen passing mainly upwards and inwards to their insertion.

The lower intercostal nerves and blood-vessels lie between this muscle and the transversalis abdominis.

The course of the rectus abdominis muscle is intersected by transverse bands of fibrous tissue, usually three in number, but, as in this specimen, occasionally more numerous, and placed at the costal margin, opposite the umbilicus, and midway between these two points. These are called the lineal transversal.

The interval between the muscles of opposite sides constitutes the *linea alba*, and is composed of fibrous tissue. It is widest above the umbilicus, and, below that level, the muscles of opposite sides gradually approach one another and come into contact, so that difficulty may be experienced in finding the interval between them.

The figures indicate—

1. Pectoralis major muscle.
2. Rectus abdominis.
3. Insertion of rectus.
4. 5, 6, and 7. Tendinous intersections of the rectus.
8. Anterior sheath of rectus, divided.
9. Divided edge of internal oblique.
10. Transversalis abdominis muscle.
11. Round ligament of uterus in the inguinal canal.

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ABDOMEN.

ABDOMINAL CAVITY—No. 1.

The anterior abdominal wall has been removed, and the costal margin exposed.

The usual subdivision of the abdominal cavity into nine regions by two horizontal and two vertical planes is shown by wires. The vertical wires extend upwards from the middle of Poupart's ligament. The lower horizontal ones extend between the tubercles on the outer lip of the crest of each ilium, and the upper ones pass between the lowest points of the tenth costal arches. The position of the umbilicus is indicated by the letter U.

The *great omentum* is a double fold of peritoneum, attached to the greater curvature of the stomach on the one hand, and passing downwards for a variable distance. It then turns upwards, and envelopes the transverse colon, and is continued on to the posterior abdominal wall as the transverse meso-colon.

A portion of the transverse colon comes into view in this specimen, on account of the contraction of the stomach and the distension of the colon, but in many cases, the transverse colon is not at once seen when the abdominal cavity is opened.

The general disposition of the omentum and viscera is seen. In this subject the stomach is empty and contracted, and the transverse colon, which is distended, passes upwards in front of the stomach and conceals it from view.

The superficial contents of the different regions are seen to be as follows.—

1. Right hypochondrium—hepatic flexure.
2. Epigastric region—liver, transverse colon covering the stomach and omentum.
3. Left hypochondrium—splenic flexure.
4. Right lumbar—ascending colon.
5. Umbilical—omentum covering coils of intestine.
6. Left lumbar—omentum covering small intestine and descending colon.
7. Right iliac—caecum.
8. Hypogastric—pelvic colon and bladder.
9. Left iliac—iliac colon

The figures indicate:—

1. Ligamentum teres.
2. Lower margin of liver.
3. Transverse colon in front of the stomach.
4. Omentum.
5. Hepatic flexure of colon.
6. Upper part of caecum.
7. Apex of urinary bladder.

U, position of umbilicus.

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ABDOMEN.

ABDOMINAL CAVITY—No. 2.

The great omentum has been removed, to show the arrangement of the coils of intestine.

The usual sub-division of the abdominal cavity into nine regions is shown by the wires laid on the surface. The positions occupied by different parts of the alimentary canal vary greatly, and no definite arrangement can be laid down applicable to all cases. The principal factors which produce these changes in position are the distension and contraction of the hollow viscera, and constriction of the abdominal wall, as well as the position of the body, respiratory movements, etc.

In this subject, the stomach is empty, the small intestine is well filled, and the large intestine distended in certain parts, especially the caecum, ascending colon, transverse colon, and pelvic colon. To ascertain the arrangement of the intestine, several coils were numbered, and the distances of the different coils so numbered from the duodenum were measured after removal of the intestine.

There is no definite arrangement of these coils, but it may be stated generally that the proximal coils lie in the upper and left segment of the abdominal cavity, and pass thence down towards the right and lower part of the cavity.

The loop indicated by **2** was 4½ feet from the duodeno-jejunal flexure, **3** was 3 feet further on, **4** was 2 feet beyond 3, **5** was 2½ feet beyond 4, 6 was 1½ foot beyond that, and from **6** to the end of the ilium was 4 feet.

The distended pelvic colon—indicated by **7** and **8**—occupies the greater portion of the lower segment of the abdomen.

The figures indicate—

1. Transverse colon.
2-6. Loops of small intestine.
7-8. Loops of pelvic colon, greatly distended.
9. Upper part of caecum.
10. Ascending colon.
11. Hepatic flexure.
12. Loop in transverse colon.

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ABDOMEN - ABDOMINAL CAVITY. No. 2.

SECTION V.

ABDOMEN.

ABDOMINAL CAVITY.—No. 3.

The small intestine has been removed, and the mesentery divided close to its root.

This view illustrates the regions of the abdomen occupied by the small intestine when the stomach is empty, and the large intestine is distended.

From the posterior abdominal wall a double fold of peritoneum, the mesentery, passes off along a line extending from the left side of the second lumbar vertebra downwards into the right iliac fossa. This fold divides the lower part of the abdominal cavity into a right and a left half.

In this specimen, the greater part of the small intestine was pushed upwards and to the left, by the distended pelvic colon, and was enabled to pass upwards on account of the contracted state of the stomach.

The descending colon is, as usual, firmly contracted, and the peritoneum on either side of it is raised into transverse folds. To its inner side, at the upper part, is seen the projection of the left kidney, crossed by a branch of the inferior mesenteric artery, and the splenic flexure lies well under cover of the left costal margin. The arrangement of the coils of the pelvic colon when distended is clearly seen, and the consecutive loops are numbered.

The figures indicate—

1. Descending colon.
2. Iliac colon.
3, 4, 5, and 6. Consecutive loops of the pelvic colon.
7. Caecum.
8. Ascending colon.
9. Lies below the hepatic flexure.
10. Transverse colon.
11. Commencement of the jejunum, divided.
12. Branch of inferior mesenteric artery behind the peritoneum.
13. Folds of peritoneum passing from the descending colon.

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ABDOMEN ABDOMINAL CAVITY No 3
SECTION V.

ABDOMEN.

ABDOMINAL CAVITY—No. 4.

The small intestine and the pelvic colon have been removed, and the caecum opened, and the peritoneum has been removed from the front of the descending portion of the duodenum.

The peritoneum, covering the posterior abdominal wall, is seen; and also the root of the mesentery, passing from the duodeno-jejunal junction, on the left side of the second lumbar vertebra, downwards and to the right.

The root of the transverse meso-colon is seen, from which that mesentery projects forwards, dividing the abdominal cavity into a *supra-mesocolic* and an *infra-mesocolic* compartment. The latter passes upwards as a deep recess below the stomach, and behind the left costal margin.

The V-shaped attachment of the pelvic meso-colon should be noticed.

In the interior of the caecum, the orifice of the ileum is seen, and it may be noted that in this specimen the terminal part of the ileum enters the caecum practically at a right angle, and not in the usual oblique manner from below upwards.

The *vermiform appendix* arises from the inner and back part of the caecum, and in this specimen it is directed upwards and inwards, towards the umbilicus. It has a mesentery, derived from the lower part of the mesentery of the ileum.

The small orifice of the appendix is here guarded by a small crescentic fold resembling a valve.

The figures indicate—

1. Pylorus.
2. Duodenum and reflection of transverse meso-colon.
3. Second part of duodenum.
4. Root of the mesentery.
5. Ascending portion of duodenum.
6. Peritoneal fold for appendix.
7. Termination of ileum.
8. Opening of ileum into the cæcum.
9. Opening of appendix into the caecum.
10. Vermiform appendix.
11. Terminal part of pelvic colon.
12. and 13. Pelvic meso-colon.
14. Iliac colon.
15. Peritoneum covering left kidney.
16. Branch of the inferior mesenteric artery crossing the left kidney.
17. Duodeno-jejunal flexure.

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ABDOMEN.

ABDOMINAL CAVITY.—No. 5.

VISCERA IN A FEMALE SUBJECT.

The arrangement of the movable viscera within the abdominal cavity shows a great amount of variation in different individuals, depending upon several conditions, such as, the amount of distension of different parts of the alimentary canal, and in the female, upon the constriction of the lower part of the thoracic wall which occurs in tight-lacing. The specimen seen here illustrates a condition which is found in a certain number of such cases, and illustrates some of the changes which apparently may be produced by such constriction. The principal alterations are that the liver has been pushed downwards by the constriction of the thoracic wall, and there has been a descent of the pyloric region of the stomach, and a shifting of the whole body of the organ to the left so that the lesser curvature is vertical in position, and lies a considerable distance from the under surface of the liver.

The first part of the colon is greatly distended, and the first part of the transverse colon passes up in front of the lower border of the liver, and then along the lesser curvature of the stomach. The remaining part was firmly constricted, and passed along the greater curvature of the stomach, upwards to the left hypochondriac region. The coils of small intestine were almost entirely displaced down into the cavity of the pelvis. Abdominal symptoms were entirely absent during life in this case, and this view has been included in order to show an extreme degree of a condition of the stomach which may exist without special symptoms, and, it may be added, almost any intermediate condition may also be found.

The figures indicate—

1. Falciform of the liver ligament.
2. Anterior surface of the stomach.
3. A loop of small intestine.
4. Caecum, considerably dilated.
5. Transverse colon.

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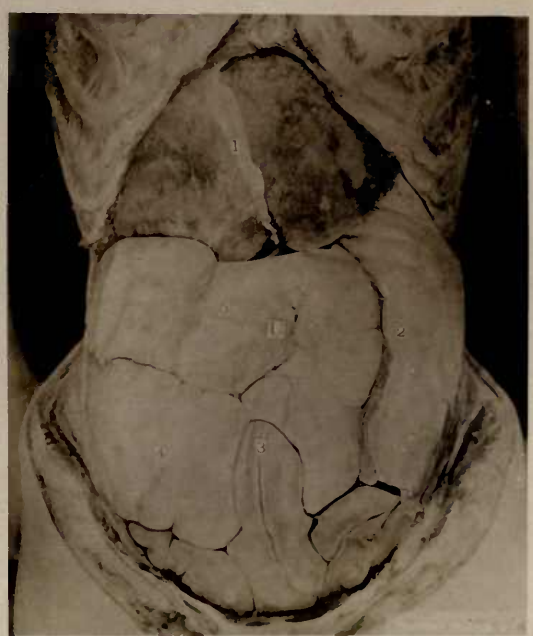

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ABDOMEN.

ABDOMINAL CAVITY.—No. 6.

FROM THE SAME SUBJECT AS THE PRECEDING VIEW.

The small intestine has been removed, and also a portion of the colon, and the caecum opened.

The positions of the pyloric portion of the stomach and of the pyloric orifice are seen, and also the interior of the caecum.

The **pyloric orifice** has moved downwards and to the left, and the duodenum has been thrown into a loop.

This view shows in a very typical manner the structure of the ileo-caecal orifice, and the retinacula which pass round the interior of the caecum. The vermiform appendix is seen passing down into the pelvis.

The anterior surface of the liver shows the groove which contained the first part of the transverse colon.

The figures indicate—

1. Anterior surface of the stomach.
2. Pyloric portion of the stomach.
3. Pyloric orifice.
4. First part of the duodenum.
5. Second part of the duodenum.
6. Cut edge of the mesentery.
7. Vermiform appendix.
8. On a retinaculum, above the ileo-caecal orifice.
9. Orifice of the vermiform appendix.
10. Pelvic colon.

ABDOMEN ABDOMINAL CAVITY No. 6
SECTION V.

ABDOMEN.

ABDOMINAL CAVITY—No. 7.

GENERAL VIEW OF THE POSTERIOR ABDOMINAL WALL AND OF THE VISCERA RESTING ON IT.

This view illustrates a large number of important anatomical relationships, and attention may be directed to the abdominal aorta lying in front of the bodies of the vertebræ, with the psoas muscle lying on each side. A number of structures lie in relation to these muscles, such as the inferior vena cava, the inferior mesenteric vessels, the ureters, spermatic vessels, and the branches of the lumbar plexus.

The pancreas and duodenum are seen lying mainly in the epigastric region. The duodenum overlaps the front of the right kidney, while the pancreas passes in front of the left. The right kidney lies at a somewhat lower level than the left, and the branches of the inferior mesenteric artery should be noticed crossing in front of the left kidney.

The greater part of the pelvic colon has been removed, leaving only the termination, which is distended, and which is seen, in this case, to be on the right side of the pelvis.

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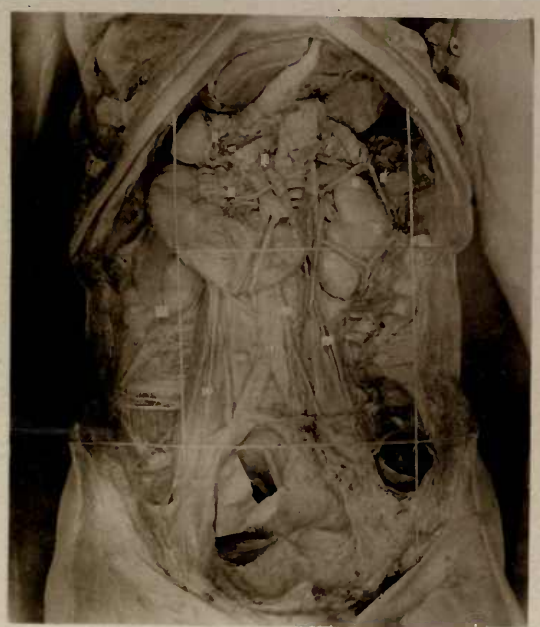
The figures indicate—

1. First part of duodenum.
2. Second part of duodenum.
3. Third part of duodenum.
4. Duodeno-jejunal flexure.
5. Head of pancreas.
6. Superior mesenteric vessels
7. Tail of pancreas.
8. Spleen.
9. Left kidney.
10. Right kidney.
11. Aorta
12. Inferior vena cava.
13. Right spermatic vessels.
14. Inferior mesenteric artery.
15. Ureter.
16. Inferior mesenteric vein.



SECTION V. ABDOMEN ABDOMINAL CAVITY. No. 7.

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ABDOMEN.

ABDOMINAL CAVITY.—No. 8.

SUPERFICIAL VIEW OF THE ABDOMINAL AND THORACIC VISCERA IN SITU.

This view shows a condition of the hollow abdominal viscera which is found in a large number of cases.

The condition is as follows:—The stomach is well filled, but retains an almost horizontal direction, and it is bounded by the liver on the right side, the diaphragm above and the transverse colon below. The greater curvature is almost horizontal, and looks directly forwards.

The small intestine is moderately distended, and the large intestine very considerably dilated, but the collapse of the wall shows that this distension has been largely gaseous, and not due to solid contents.

This distension has pushed the liver well up into the right hypochondriac region, so that it does not extend far beyond the mesial plane.

The transverse colon is moulded upon the under surface of the stomach, and, passing beyond it, comes into contact with the projecting lower end of the spleen, which is here of a long and narrow shape, so that its lower end can be seen from the front.

The surface of the left lung is exposed, and its shape is very typical. The pleura was somewhat adherent to the right lung.

The thymus gland projects downwards in front of the pericardium, but it is larger in this subject—a young subject, æt. six—than is usually the case in an adult.

The figures indicate—

1. Greater curvature of the stomach.
2. Left lobe of liver.
3. Pericardium.
4. Transverse colon.
5. Lower end of spleen.
6. Thymus gland.

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ABDOMEN.

ABDOMINAL CAVITY.—No. 9.

THE SMALL INTESTINE HAS BEEN REMOVED BY DIVIDING THE MESENTERY NEAR ITS ROOT, AND THE GREAT OMENTUM AND TRANSVERSE COLON HAVE ALSO BEEN REMOVED.

This view, from the same subject as No. 8, shows how the stomach is supported below to a great extent by the intestine.

The form and position of the stomach are highly characteristic, and it will be noticed that the pylorus has moved somewhat to the right of the mesial plane of the body.

The condition of the large intestine is of great interest. Following upon distension of the proximal part of the colon, the cæcum has become dilated, and so altered in its shape and position as to resemble a second stomach situated in the hypogastric region.

The termination of the ileum enters this dilated chamber almost vertically, and the appendix vermiformis is seen lying behind and above the cæcum. This is another of the numerous positions which it may assume, and it may be said in this case to lie more in the left than in the right side of the body.

The descending colon, as is almost invariably the case in subjects prepared with formalin, is firmly contracted, but the large loop of the pelvic colon shows a moderate degree of distension.

The figures indicate:—

1. Left lobe of the liver.
2. Antero-superior surface of stomach.
3. Pylorus.
4. Duodeno-jejunal flexure.
5. Termination of ileum.
6. Appendix vermiformis.
7. Cæcum.
8. Hepatic flexure of colon.
9. Descending colon.
10. Pelvic colon.
11. Urinary bladder.
12. Splenic flexure of colon.

ABDOMEN.

ABDOMINAL CAVITY—No. 10.

IN ADDITION TO THE PREVIOUS DISSECTION, THE CÆCUM AND ASCENDING COLON HAVE BEEN REMOVED, AND THE PERITONEUM STRIPPED OFF THE POSTERIOR ABDOMINAL WALL.

This view shows in a very typical manner the anterior relations of the kidneys.

The anterior surface of the right kidney is very largely in contact with viscera—namely, the liver above, the hepatic flexure in the outer part, and the duodenum on the inner side, so that only the lower end is visible, while the left kidney is seen to have the pancreas and suprarenal capsule in contact with its upper part, and the colon along its outer margin, while the termination of the duodenum reaches the hilum. Branches of the inferior mesenteric artery crossing its surface constitute an important relation from a surgical standpoint.

The arrangement of the pelvic colon is noticeable. In a young subject, such as this, it frequently does not descend into the pelvis, which is relatively small, but is entirely intra-abdominal in position.

The dilated cæcum occupied nearly the whole of the anterior part of the pelvic cavity.

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The figures indicate—

1. Stomach.
2. Liver, and ligamentum teres.
3. Pylorus.
4. Second part of duodenum.
5. Superior mesenteric vessels.
6. Hepatic flexure of colon.
7. Splenic flexure of colon.
8. Pelvic colon.
9. Left kidney.
10. Abdominal aorta.
11. Body of pancreas.
12. Urinary bladder.

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ABDOMEN.

ABDOMINAL AORTA—No. 1.

TO SHOW THE ABDOMINAL AORTA, THE BED OF KIDNEYS, ETC.

The kidneys, the upper parts of the ureters, the ovarian vessels, and a portion of the inferior vena cava have been removed, to show the bed of the kidneys, the gangliated cord of the sympathetic, and the branches of the lumbar plexus in relation to the psoas muscles.

The three principal foramina in the diaphragm are seen, the *œsophageal* to the left side, the *aortic* in the mesial plane and lowest, while the *inferior caval opening* is to the right and is the highest of the three.

The *bed of the kidneys* is seen to be formed by the diaphragm above, the crus of the diaphragm and the psoas muscle internally, and the quadratus lumborum and tendon of the transversalis abdominis externally.

The *abdominal aorta* enters the abdomen under cover of the ligamentum arcuatum medium of the diaphragm, and runs down in front of the vertebral column as far as to the fourth lumbar vertebra, where it terminates by dividing into the two common iliac arteries. The *cœliac axis* and the *superior mesenteric* arteries are seen arising from the commencement of the aorta and, from its anterior aspect, lower down the *inferior mesenteric*. The *middle sacral* which arises from the posterior aspect of the aorta is seen between the two common iliacs. Some *lumbar* branches, which arise rather from the posterior aspect are also seen.

The figures indicate—

1. Oesophagus.
2. Ligamentum arcuatum medium.
3 and 4. Left and right renal vessels.
5. Inferior mesenteric artery.
6. Right common iliac artery crossing the left common iliac vein.
7. Ureters crossing the common iliac arteries.
8. Gangliated cord of the sympathetic.
9. Last dorsal (subcostal) nerve.
10. Ilio-inguinal and ilio-hypogastric nerves.
11. External cutaneous nerve.
12. Accessory nerve to the external cutaneous nerve.
13. Genito-crural nerve. There is a well-marked psoas minor muscle here also.

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ABDOMEN.

BLADDER—No. 1.

TWO SPECIMENS OF THE BLADDER, PROSTATE, ETC., VIEWED FROM BELOW.

In A the bladder is moderately distended, and in B it is empty.

The *inferior surface* of the bladder is in contact, at the back, with the base of the prostate, and, in this region, it is called the *neck*, and contains the aperture of the urethra. From this point, the urethra passes through the substance of the prostate, and emerges from its rounded tip.

In front of the prostate, the under surface of the bladder is rounded, and it is sometimes divided into two lateral halves by a median sagittal border which passes forwards to the apex of the bladder.

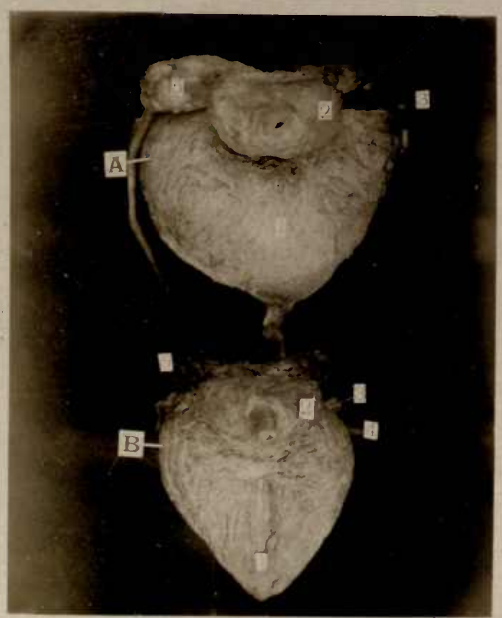
The inferior surface passes almost insensibly into the basal aspect behind, and it is separated from the upper surface by the lateral borders of the bladder.

This under surface is in contact with the pubic symphisis and body of the pubis, the retro-pubic pad of fat, and the levator ani and obturator internus muscles.

As the bladder fills, this surface becomes more rounded, and is elongated, so that the apex of the bladder passes upwards above the symphisis pubis.

The figures indicate—

1. Inferior surface of the bladder.
2. Lateral surface of the prostate.
3. Termination of the ureter.
4. Vas deferens.
5. Seminal vesicle.



ABDOMEN BLADDER No. 1
SECTION V.

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ABDOMEN.

BLADDER.—No. 2.

BLADDER, PROSTATE, AND SEMINAL VESICLES, SEEN FROM BEHIND.

The *prostate* is an unpaired glandular body, of the shape of a chestnut, the rounded tip of which projects downwards.

The upper surface, or *base*, is directed upwards and forwards. It is pierced by the *ejaculatory ducts*. In front of that point it is in contact with the bladder, and, behind it, with the seminal vesicles. The *posterior surface* is flat, and is in relation to the anterior wall of the rectum.

The surface of the prostate is smooth, and is covered behind and at the sides by a sheath of connective tissue, the fascia prostatæ.

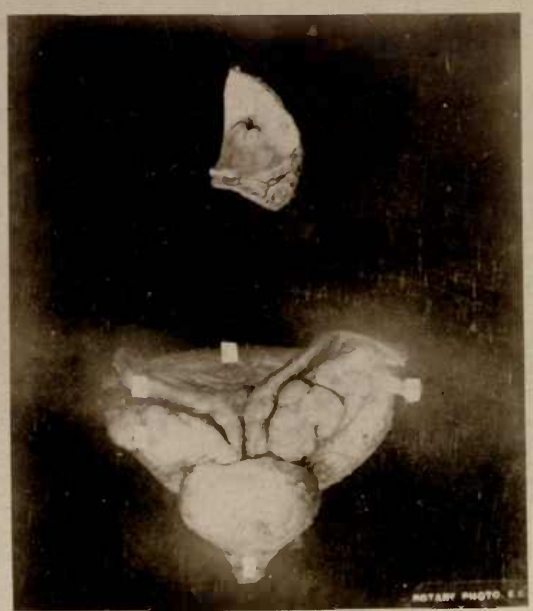
The *seminal vesicles* are situated above and behind the prostate. They are paired, oblong, flattened bodies, with a nodular surface. They lie along the outer side of the termination of the vas deferens, and the upper end touches the terminal part of the ureter. The posterior surface is covered in its upper half or third by peritoneum.

The terminal part of the *vas deferens* lies behind the bladder, and presents a spindle-shaped dilatation called the Ampulla. From the internal abdominal ring as far as to the middle of the ampulla, the vas deferens lies immediately under the peritoneum.

The figures indicate—

1. Urethra.
2. Posterior surface of the prostate.
3. Seminal vesicle.
4. Vas deferens.
5. Ureter.
6. Upper surface of the bladder, covered by peritoneum.
7. A small portion of the interior of the bladder, to show the urethral orifice, and the papilla which projects into the bladder behind it.

ABDOMEN BLADDER No. 2
SECTION V.



ABDOMEN.

BLADDER—No. 3.

TWO SPECIMENS OF BLADDER, PROSTATE, AND SEMINAL VESICLES VIEWED FROM THE SIDE.

In the upper specimen the peritoneum has been left, covering the upper surface, and the line of reflection is seen separating the upper from the lower surface.

Prostate. The apex points downwards and is in contact with the deep layer of the triangular ligament, and the urethra issues from it.

The posterior surface is flattened and is related to the rectum, while the lateral surfaces are rounded and are in relation to the levator ani muscle. There is no indication on the surface of any sub-division of the gland into lobes.

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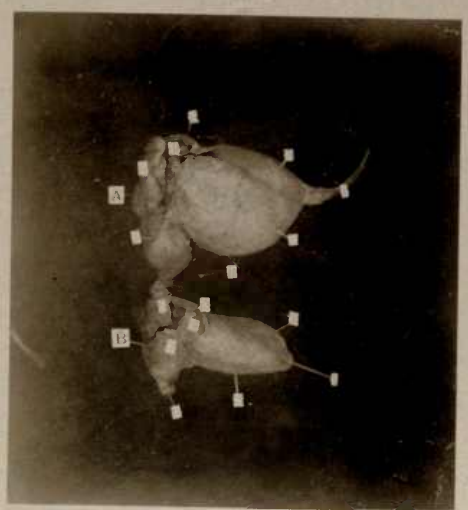
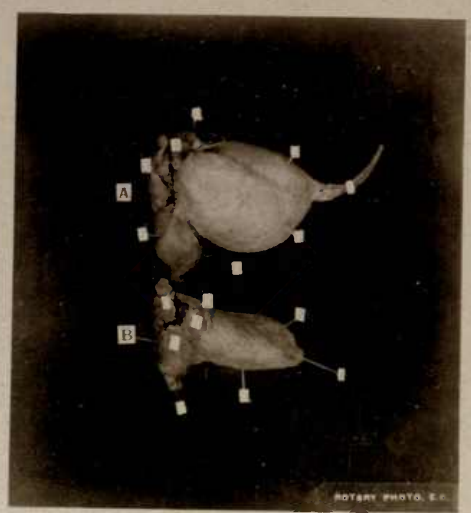
The figures indicate—

1. Apex of the bladder and urachus.
2. Upper surface of bladder.
3. Inferior.
4. Ureter.
5. Vas deferens.
6. Seminal vesicle
7. Prostate gland.
8. Apex of prostate and urethra issuing from it.





SECTION V. ABDOMEN BLADDER No. 3

ABDOMEN.

INGUINAL REGION—No. 1.

SUPERFICIAL DISSECTION.

The *superficial structures* include vessels, nerves, and two sets of lymphatic glands; a *femoral* set, placed along the line of the internal saphenous vein, which receive the lymphatic vessels from the lower limb, and an *inguinal* group, along the line of Poupart's ligament, which receive the lymphatic vessels from the genitals, perineum, and the surface of the abdomen below the umbilicus. The latter set of glands is affected in venereal infection of the external genitals.

The efferent vessels from these glands pierce the fascia lata, or the cribriform fascia, and so pass through the saphenous opening to deeper lymphatic vessels.

The internal saphenous vein is seen to receive a large posterior branch and to pass through the saphenous opening, after receiving the superficial inguinal veins.

The spermatic cord is seen emerging from the external abdominal ring.

The figures indicate—

1. Spermatic cord and coverings.
2. Internal pillar of the external abdominal ring.
3. External „ „ „
4. Ilio-inguinal nerve.
5-6. Inguinal lymphatic glands.
7. Femoral lymph gland.
8. Junction of internal saphenous vein with its posterior tributary.
9. Cribriform fascia covering the saphenous opening.

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ABDOMEN.

INGUINAL REGION—No. 2.

SAPHENOUS OPENING AND EXTERNAL ABDOMINAL RING.

This view shows the apertures through which femoral and inguinal herniae appear.

The *Saphenous opening* is an oval aperture in the deep fascia of the thigh, one inch long, and half an inch wide, or slightly larger, situated about an inch and a half below and external to the spine of the pubis. The outer edge, which is strong, and is called the falciform process, passes upwards to join Gimbernat's ligament, while the inner edge lies on a posterior plane, and passes behind the femoral vessels. The internal saphenous vein and lymphatic vessels pass through the opening to join the deeper vessels. The thin cribriform fascia, which covers the opening, has been removed.

The fascia on the inner side covers the pectineus muscle, and is called the pubic fascia; that on the outer side is the iliac fascia.

The *external abdominal ring*, the outlet of the inguinal canal, is a triangular aperture in the aponeurosis of the external oblique muscle of the abdomen, which, in the male, transmits the spermatic cord and its coverings, and the ilio-inguinal nerve; and, in the female, the round ligament. The margins are united by some thin transverse fibres, called the intercolumnar fibres, which have been removed, in order to show the ring as an aperture.

The figures indicate—

1. Arcuate fibres of the external oblique aponeurosis.
2. Poupart's ligament.
3. External pillar of the external abdominal ring.
4. Internal pillar of the external abdominal ring.
5. Falciform edge.
6. Fascia of pectineus muscle.
7. Spermatic cord.
8. Femoral vein.

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ABDOMEN INGUINAL REGION. No. 2.
SECTION V.

ABDOMEN.

INGUINAL REGION.—No. 3.

The aponeurosis of the external oblique has been divided and turned down, to show the spermatic cord lving in the inguinal canal.

The **Inguinal Canal** is an oblique, flattened passage through the abdominal wall, measuring about an inch and a half in length, and extending from the internal to the external abdominal ring, above the inner half of Poupart's ligament. In shape, it is a groove formed by the union of Poupart's ligament and the fascia transversalis.

It is described as having an anterior and a posterior wall, a roof, and a floor.

The *anterior wall* of the inguinal canal is formed by the aponeurosis of the external oblique muscle, and also by the internal oblique in the outer part.

The internal oblique arches over the canal, and forms a roof for it.

The external spermatic fascia was divided at the external abdominal ring, and is seen forming a covering for the spermatic cord as it passes to the scrotum. The ilio-inguinal nerve is seen joining the cord near the internal ring, and the ilio-hypogastric nerve lies higher up.

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The figures indicate—

1. Aponeurosis of external oblique muscle.
2. Aponeurosis of internal oblique muscle.
3. Spermatic cord lying in the inguinal canal.
4. External spermatic fascia.
5. Root of penis.
6. Fascia of Scarpa.
7. Ilio-inguinal nerve.

ABDOMEN INGUINAL REGION No 3
SECTION V.

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ABDOMEN.

INGUINAL REGION—No. 4.

The external and internal oblique muscles have been reflected, and a portion of the spermatic cord cut away to show the posterior wall of the inguinal canal.

This *posterior wall* is formed, from within outwards, by the triangular fascia, the conjoined tendon, and transversalis fascia. Through an opening in the transversalis fascia the deep epigastric vessels are seen running upwards in the inner side of the internal ring.

The *triangular fascia* is a membranous structure, continuous with the aponeurosis of the external oblique of the opposite side, and forming an insertion for it into the crest of the pubis and the ilio-pectineal line.

It lies behind the inner pillar of the external abdominal ring.

The *internal abdominal ring* lies half an inch above, and to the inner side of the middle of Poupart's ligament.

It is the inlet for the inguinal canal, and at this point the transversalis fascia gives off a pouch-like process, which envelopes the spermatic cord.

The figures indicate—

1. Aponeurosis of external oblique muscle, divided.
2. Internal oblique muscle, divided.
3. Transversalis abdominis muscle.
4. Conjoined tendon.
5. Triangular fascia.
6. Spermatic cord, divided.
7. Fascia transversalis.
8. Deep epigastric vessels.
9. Root of penis.

ABDOMEN. INGUINAL REGION. No. 4.
SECTION V.

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INGUINAL REGION—No. 5.

In addition to the previous dissections, the sheaths of the recti muscles have been opened, and a portion of the rectus abdominis muscle removed on the right side, to show the posterior wall of the sheath.

The sheath of the rectus is a membranous structure, derived from the aponeurosis of the flat abdominal muscles.

The aponeurosis of the internal oblique enters into the formation of both the anterior and posterior walls of the sheath, and the aponeurosis of the external oblique passes into the anterior lamella, and that of the transversalis into the posterior.

In the sheath are seen the rectus and pyramidalis muscles, the deep epigastric vessels, and the terminal branch of some of the lower intercostal nerves.

The *semilunar fold of Douglas* is the lower free margin of the posterior wall of the sheath, which stops at a point midway between the umbilicus and the pubis, and below this level, the rectus is in contact with the fascia transversalis (7).

This view also shows the relation of the conjoint tendon to the sheath of the rectus.

The figures indicate—

1. Aponeurosis of external oblique.
2. Aponeurosis of internal oblique.
3. Conjoined tendon.
4. Linea alba.
5. Rectus abdominis muscle.
6. Pyramidalis muscle.
7. Transversalis fascia.
8. Deep epigastric vessels.
9. Transversalis abdominis muscle.
10. Spermatic cord, divided.
11. Semilunar fold of Douglas.

ABDOMEN INGUINAL REGION. No. 5.
SECTION V.

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ABDOMEN.

INGUINAL REGION—No. 6.

DISSECTION OF THE INGUINAL CANAL AND ADJACENT REGIONS ON BOTH SIDES OF THE BODY.

The aponeurosis of the external oblique has been reflected on both sides, and that of the internal oblique on the right, and the right spermatic cord has been divided and partly removed.

An ascending branch of the deep circumflex iliac artery is seen on the right side, running between the internal oblique and transversalis muscles. This vessel is a useful guide to the interval between these two muscles, indicating the depth to which the abdominal wall has been divided.

The figures indicate—

1. Aponeurosis of external oblique muscle.
2. Aponeurosis of internal oblique muscle.
3. Transversalis abdominis muscle.
4. Conjoined tendon.
5. Triangular fascia.
6. Spermatic cord (left side).
7. Transversalis fascia.
8. Situation of external abdominal ring.
9. Divided ends of spermatic cord.
10. Root of penis.
11. Ascending branch of deep circumflex iliac artery.
12. Deep epigastric vessels.
13. Ilio-inguinal nerve (left side).
14. Fascia of Scarpa continued into the scrotum.

ABDOMEN INGUINAL REGION. No. 6

SECTION V.

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LUMBAR REGION.—No. 1.

THE SKIN AND LAYERS OF FASCIA HAVE BEEN REMOVED, LEAVING THE CUTANEOUS NERVES, TO SHOW THE MUSCLES.

The cutaneous nerves of the lower part of the back are derived from the posterior primary divisions of spinal nerves.

From the lower six dorsal nerves branches are given to the skin through the external branches of these nerves, and branches, lower down, are given off by the upper three lumbar, and from two or three sacral nerves.

The lumbar nerves become cutaneous by piercing the lumbar aponeurosis near the outer margin of the erector spinæ, while the sacral twigs pierce the gluteus maximus.

The **latissimus dorsi** arises from the spines and supra-spinous ligaments of the lower six dorsal vertebræ, from the posterior lamella of the lumbar aponeurosis, by which it is attached to the lumbar spines, to the sacrum and iliac crest, and it also gains a separate origin from the crest of the ilium in front of the attachment of the lumbar aponeurosis. It may also gain a few fibres from the dorsal surface of the lower angle of the scapula. It is also attached to the lower three or four ribs.

The **triangle of Petit** is a small triangular intermuscular interval, above the crest of the ilium between the latissimus dorsi and external oblique muscles. It is a weak point in the abdominal wall, and may be the site of a lumbar hernia.

The **bony landmarks** which attract attention are—(1) the crest of the ilium, (2) the posterior superior iliac spines, which are on a level with the second sacral spine, (3) the sacral cornua, between which is a depression corresponding to the inferior opening of the sacral canal.

The prominence of the erector spinæ muscle is of importance, and especially the furrow at its outer margin, where the three layers of the lumbar aponeurosis unite with one another.

This furrow is a useful landmark in operations on the kidneys from the back.

The figures indicate—

1. Trapezius.
2. Latissimus dorsi.
3. Triangle of auscultation.
4. Rhomboideus major.
5. External oblique of abdomen.
6. Lumbar aponeurosis.
7. Triangle of Petit.
8. Gluteus medius.
9. Gluteus maximus.
10. Posterior superior iliac spine.
11. Sacral cornua.
12. Internal cutaneous branch.
13. External cutaneous branch.
14. Lumbar cutaneous branch.

LUMBAR REGION. No. 1.

SECTION V.

LUMBAR REGION—No. 2.

ON THE RIGHT SIDE, MUSCLES AND APONEUROSIS HAVE BEEN REMOVED TO SHOW THE ERECTOR SPINÆ, WHILE ON THE LEFT, THE GREATER PART OF THE ERECTOR SPINÆ HAS BEEN REMOVED TO SHOW THE MULTIFIDUS SPINÆ.

The erector spinæ muscle and prolongations from it fill up the hollow on either side of the vertebral column. The muscle itself consists of a flattened tendinous portion which lies superficially in the lumbar and sacral regions, and of a mass of fleshy tissue which lies on its anterior surface. From the origin of the muscle bands pass in different directions to gain insertion into ribs and vertebræ. The three principal columns into which the muscle divides are shown here. They are the ilio-costalis on the outer side, the longissimus dorsi in the centre, and the spinalis dorsi close to the vertebral spines. Cutaneous nerves emerge between the first two.

The multifidus spinæ in this region is a thick fleshy mass, covered by the erector spinæ, the bundles of which it is composed passing upwards and inwards to be inserted into the vertebral spines.

In front of these structures lies the quadratus lumborum, its outer margin projecting beyond that of the vertebral muscles.

The lumbar aponeurosis, the middle lamella of which covers the quadratus lumborum, and which gives origin to the internal oblique and transversalis abdominis muscles, has been removed, so that the descending colon is visible, with some nerves.

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The figures indicate—

1. Posterior superior iliac spine.
2. Sacral cornu.
3. Last rib.
4. Transverse process of first lumbar vertebra.
5. Spine of second lumbar vertebra.

Muscles.

6. Quadratus lumborum.
7. Ilio-costalis.
8. Musculus accessorius.
9. Longissimus dorsi.
10. Spinalis dorsi.
11. Multifidus spinæ.
12. Levator costæ.
13. External intercostal.
14. Lumbar aponeurosis, middle lamella.
15. Extraperitoneal fat, and ilio-inguineal and ilio-hypogastric nerves.

LUMBAR REGION.—No. 3.

THE MUSCLES OF THE BACK HAVE BEEN REMOVED DOWN TO THE QUADRATUS LUMBORUM ON THE LEFT SIDE AND TO THE PSOAS ON THE RIGHT, TO SHOW THE KIDNEYS AND THE PLEURAL MEMBRANES.

The left kidney is normal, the right is somewhat atrophied, and displaced downwards.

The position of the kidneys from behind is as follows (see left side): In a vertical direction the kidney extends from the level of the eleventh dorsal spine to that of the lower margin of the third lumbar spine, and the outer border lies about 3¾ ins. from the mesial plane, and the inner border about 1 in.

The upper portion is concealed from view by the last rib, by the diaphragm, and by the pleura.

Lower limit of pleura. At the back the pleura is here found to pass as far down as to the transverse process of the first lumbar vertebra. Frequently it is about ½ in. higher, *i.e.* between the neck of the last rib and this transverse process. It should be noted that the transverse process of the first lumbar vertebra is almost at the same level as the lower margin of the spine of the last dorsal vertebra.

The diaphragm has been cut away on the left side, but on the right the ligamentum arcuatum externum is seen stretching from the last rib towards the transverse process of the first lumbar vertebra.

Laterally, each kidney is in close relation to the colon, the right to the ascending, and the left to the descending.

The figures indicate—

Large numbers—corresponding dorsal and lumbar vertebrae. The small numbers—

1. Quadratus lumborum.
2. Psoas.
3. Diaphragm, crus.
4. Hio-lumbar ligament.
5. Right kidney.
6. Left kidney.
7. Ascending colon.
8. Descending colon.
9. Pleura approaching spine.
10. Pleura in eleventh interspace.
11. Peritoneum covering liver.
12. Nerve, artery, and vein in intercostal space.

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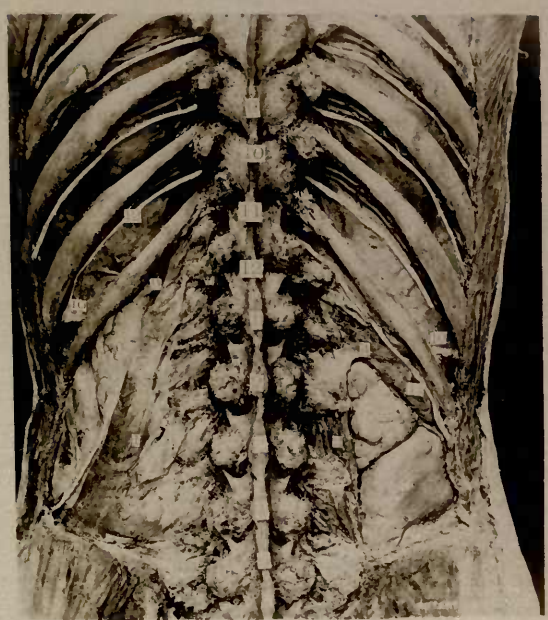

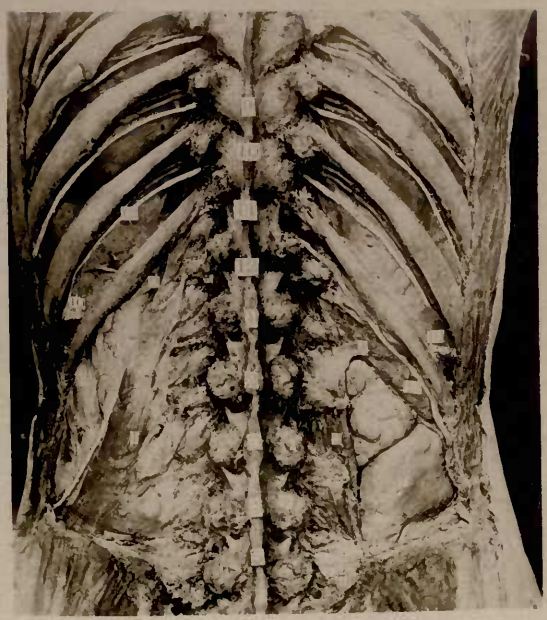

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LUMBAR REGION.—No. 4.

KIDNEYS AND ADJACENT VISCERA, SEEN FROM BEHIND.

The right kidney has been displaced downwards, and is atrophied; the left kidney appears to be normal.

Left kidney. The upper portion of this kidney is seen to be in intimate relation with the spleen at its outer part, and, on its inner and anterior aspect, with the suprarenal capsule, while the splenic flexure and the descending colon lie in contact with the lower part of the outer border and the anterior surface. The renal vessels are very short, and the left renal vein receives the ovarian vein of the left side. The ureter descends in a vertical direction.

Aorta. The calibre of the aorta diminishes in a very distinct manner after the origin of the two renal arteries, and the lumbar and middle sacral arteries are seen to take origin from the posterior aspect of the vessel, and not from the side.

Inferior vena cava. This vessel lies, in the lower part of its course, close beside the aorta, but as it ascends, it passes to the right, and leaves the aorta.

Right kidney. The relation of this organ to the liver illustrates the way in which compression of the abdomen can displace the kidney downwards, since it is in contact with the sloping under surface of the liver, and therefore it is pressed downwards as well as backwards. It will be noticed also that the suprarenal capsule does not share this displacement, but remains in contact with the usual area in the posterior surface of the liver.

The right ovarian vein, with which is seen a rather tortuous ovarian artery, passes to join the inferior vena cava very obliquely.

The figures indicate—

1. Abdominal aorta.
2. Inferior vena cava.
3. Right renal artery.
4. Left renal artery.
5. Right ovarian vein.
6. Left ovarian vein.
7. Right ureter.
8. Left ureter.
9. Bifurcation of aorta and origin of middle sacral artery.
10. Inferior mesenteric artery.
11. Colon (descending).
12. Left kidney.
13. Spleen.
14. Liver.
15. Left suprarenal capsule.
16. Right suprarenal capsule.
17. Right kidney.
18. Ascending colon.
19. Second part of duodenum.
20. Right crus of diaphragm.